

# Synthesis of UltraHigh-Temperature Stable Phases at Low Processing Temperatures

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HfB<sub>2</sub>/SiC composites are potential materials for *ultra-high-temperature* structural applications, primarily in the aero-space arena. Their current processing is based on hot-pressing at temperatures as high as 2000-2200°C. Throughout this project we study novel solid state chemistries to *in-situ* form HfB<sub>2</sub> at relatively “mild-temperatures” (i.e., below 1500°C). X-ray diffraction analysis confirms significant chemical reactivity between Hf-metal and boron-containing powders at or below 1500°C. The dark-field scanning transmission electron microscope (DF-STEM) image shows the reaction products HfB<sub>2</sub> (dark/red) and HfBN (light green) formed during the reaction between Hf-metal and h-BN.

